UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,883	10/03/2003	Kurt Haller	5589-04901 P1068	2324

35617 7590 03/18/2005

DAFFER MCDANEIL LLP
P.O. BOX 684908
AUSTIN, TX 78768

EXAMINER
LEE, HSIEN MING

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 03/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/678,883	**Applicant(s)** HALLER ET AL.
	Examiner Hsien-ming Lee	**Art Unit** 2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-3,8,10-16 and 19-22 is/are rejected.

7)☒ Claim(s) 4-7,9,17 and 18 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

HSIEN-MING LEE
PRIMARY EXAMINER

3/15/2005

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No~~(s)/Mail Date~~ 012904, 021904
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3, 8, 10, 11, 13-16, 19 and 20 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bultman et al. (US 6,829,559).

In re claim 1, Bultman et al., in an analogous art, teach a computer-implemented method for determining a presence of defects on front and back sides of a specimen (i.e. a wafer), comprising: utilizing a system 32, including a processor 54, directing energy source 44 toward a front side 40a and a back side 40b of the specimen 40 simultaneously (Fig.12) to determine, via detectors 46b and 46c, a presence, a number, a location and type of defects on the front 40a and back 40b sides (col. 70, lines 18-25); the determined properties (i.e. the presence, the number, the location and the type of defects) are sent back to the process 54 for **comparison** (col. 72, lines 19-33, col. 86, lines 33-46, col. 135, lines 12-23).

One of the ordinary skill in the art would have been motivated to utilize the method of Bultman et al. to **correlate or compare** the defects of the back side and the defects of the front side to differentiate if a portion of the backside defects is opposite to a portion of the frontside defects although Bultman et al. do not literally disclose the claimed limitations (i.e. correlate the defects of the back side and the defects of the front side to differentiate if a portion of the backside defects is opposite to a portion of the frontside defects). The motivation/suggestion for doing so is because Bultman et al. teach a *desirability* of correlating defects information from the frontside and the backside of the specimen (col. 86, lines 33-46, col. 135, lines 12-23) by *comparing* the determined properties from the frontside and the backside (col. 65, lines 50-52, col. 68, lines 40-45) or *determining relationship* between the determined properties (col. 65, lines 22-23).

In re claim 3, Bultman et al. also teach or suggest generating a single visual representation of the specimen that illustrates the backside defect and the frontside defect with different formatting to visually differentiate the backside defect and the frontside defect, i.e. generating *charts* to illustrate the determined *defects-related* data (Fig.10) to *differentiate* the defects from the frontside and the backside.

In re claim 8, Bultman et al. also teach or suggest comparing coordinates defining a location of the backside defect with coordinates defining a location of the frontside defect to determine if the portion of the backside defect on the backside of the specimen is opposite to the portion of the frontside defect on the frontside of the specimen because Bultman et al teach *comparing* the defects from the frontside and the backside in term of defect *location*, as stated in the rejection against claim 1.

In re claims 10-11 and 13, Bultman et al. also teach classifying the backside defect, i.e. *evaluating* the presence, the number and the type of the defects on the backside (col. 70, lines 18-25) and determining the root cause of the backside from the data representing processing history of the specimen, e.g. using the method to monitor what went wrong with the semiconductor fabrication process (col. 65, lines 60-66) or if the determined amount of processing time is insufficient (col. 153, lines 15-19).

In re claim 14, one of the ordinary skill in the art would have been motivated to use the method of Bultman et al. to classify or evaluate the backside defect, such as evaluating the presence and the type of the defect; and to alter a parameter of a process tool in response to the classification, since Bultman et al. disclose altering the parameter of an instrument coupled to a process tool such as a semiconductor fabrication process tool in response to one of the determined properties of the specimen (col. 74, lines 16-20) and altering a configuration of component 50 of the system 32 (Fig.12) in classifying the defect (col. 52, lines 9-12).

In re claim 15, one of the ordinary skill in the art would have been motivated to use the method of Bultman et al. to alter a parameter of a process tool in response to the backside defect to reduce occurrence of the frontside defect on additional specimen processed I the process tool, since Bultman et al. disclose altering the parameter of an instrument coupled to a process tool such as a semiconductor fabrication process tool in response to one of the determined properties of the specimen (col. 74, lines 16-20) and altering a configuration of component 50 of the system 32 (Fig.12) in classifying the defect (col. 52, lines 9-12). By correlating or comparing the frontside defect and the backside defect (col. 72, lines 19-33, col. 86, lines 33-46, col. 135, lines 12-23) and thus altering the parameter of the processing tool to correct problems in the processing tool, the occurrence of the defects is expected to reduce.

In re claims 16 and 19, Bultman et al. also teach or suggest correlating the backside defect detected on the backside 40b of a specimen 40 with a frontside defect detected on the frontside 40a of the specimen 40 (col. 65, lines 22-23 and 50-52, col. 68, lines 40-45) if the backside defect and the frontside defect satisfy one or more proximity criteria, i.e. a predetermined range (col. 68, lines 44-45) or a critical dimension of the specimen (col. 53, lines 8-10).

In re claim 20, Bultman et al. also teach analyzing data representing spatial characteristics of backside defects detected on a specimen to classify the backside defects, i.e. analyzing data of backside defects by examining the determined properties of the backside of the specimen to evaluate the presence, the number and the type of the defects (col. 70, lines 18-25, col. 86, lines 33-46, col. 135, lines 12-23).

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bultman et al. (US '559) in view of Stanton (US 2002/0142617).

Bultman et al. do not teach that the portion of the backside defect is aligned with the portion of the frontside defect along an axis perpendicular to the frontside and the backside of the specimen.

Stanton, however, in an analogous art, teach that a test specimen (i.e. a test wafer) has a central axis and the specimen has a frontside and backside, which are generally perpendicular to the central axis (paragraphs [0008], [0017]).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to recognize that the backside is aligned with the frontside along the central axis perpendicular to the frontside, as taught by Stanton, and so do the defects of frontside and backside in Bultman, since it is the inherent properties of the specimen having the central axis perpendicular to the frontside and the backside.

4. Claims 12, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bultman et al. (US '559) in view of Debold ("Handbook of Silicon Semiconductor Metrology", submitted by applicants).

In re claim 21, Bultman et al. do not teach that the analyzing comprising spatial signature analysis (i.e. SSA) of the data.

Debold, however, in a method of analyzing wafer defect, teaches using an automated whole-wafer analysis technique called SSA to group the wafer's defects together into spatial signatures method to assign a label to the defect distribution (fourth paragraph, page 695).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to utilize the SSA technique, as taught by Debold, in the method of Bultman et al. to group and thus to analyze the specimen's defects, since by doing so it would improve yield through the SSA characterization (last paragraph, page 695, Debold).

In re claim 22, one of the ordinary skill in the art would have been motivated to apply the SSA technique of Debold in the method of Bultman et al., to determine if analyzed data during detecting the backside defect is representative of a signature of a chuck of a process tool since the SSA is the means for the foregoing purpose, i.e. by spatial signature analyzing the specimen defects to see if the analyzed data represent the signature of the chuck of the manufacturing process (second paragraph, page 694, Debold).

In re claim 12, Bultman et al. teach correlating the frontside defect and the backside defect. Thus, one of the ordinary skill in the art would have been motivated to apply the SSA technique of Debold in the method of Bultman et al., to classify or group the defects on the frontside and the backside via the SSA technique and further determine which parameter (e.g.

scratches and particles) cause the defect appeared on the frontside of the specimen and also determine if the frontside defect result in the backside defect.

Allowable Subject Matter

5. Claim 4-7, 9, 17 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record at least neither teaches nor suggests *removing* the data representative of the signature of the chuck from the data generated during detection of the backside defect *prior to* said correlating (claim 4); *altering* one of the visual representations such that the altered visual representation appears as a *mirror image* of the one visual representation, and *superimposing* the altered and the unaltered visual representations to generate an overall visual representation of the specimen (claim 5); *altering the coordinates* defining the location of the frontside defect prior to comparing (claim 9); and defining the backside defect as a geometrical figure having lateral dimensions larger than the backside defect, wherein the one or more proximity criteria are satisfied if at least a portion of the geometrical figure is opposite to at least a portion of the frontside defect (claim 17).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Tuesday-Thursday (8:00 ~ 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hsien-ming Lee
Primary Examiner
Art Unit 2823

March 15, 2005

HSIEN-MING LEE
PRIMARY EXAMINER

3/15/2005